REMARKS

Claims 1-10 were pending, all of which were rejected. Applicants request reconsideration.

Specification

The Examiner objected to the disclosure stating that in "the disclosure 'Operation in the critical **discontinuous mode** ... each period of the control signal: in page 1 lines 14-16' is not relevant." [Emphasis in the original.] The Examiner stated that "[a]ccording to figure 1 of the presentation, a current will flow through inductor (L) all the time." Applicants respectfully disagree and request reconsideration.

As stated in the specification at paragraph [0016], the operation of a DC-DC converter in the critical discontinuous mode "means that the amplitude of the current through the inductive element is substantially zero at the beginning and at the end of each period of the control signal." As taught in paragraph [0018] of the present application

> At the end of the time lapse T_{on} the switching element Q1 is rendered non-conductive by circuit part I. During the remaining part of the period of the control signal <u>the amplitude of the current through inductive element L decreases linearly to substantially zero</u>.

(emphasis added.) Thus, the present application clearly describes the converter operating in a critical discontinuous mode.

Applicants point out that a discontinuous mode of operation for a DC-DC converter with an inductive element, i.e., where periodically there is substantially no current flowing through the inductor, is well known in the art. For example, U.S. 6,597,155, which was provided by the Examiner in the present Office Action, illustrates an up converter (otherwise known as a boost converter) with a discontinuous inductive current. <u>See,</u> Fig. 3 and Fig 4 (with an inductor current waveform i_{L1} that is periodically zero). Other examples of a DC-DC converter operating in a discontinuous mode can be easily located, e.g., in electrical engineering text books.

Accordingly, Applicants submit that the "[o]peration in the critical discontinuous mode" is relevant to the present application. Reconsideration and withdrawal of the present objection is respectfully requested.

In addition, paragraphs [0008] and [0017] have been amended to correct minor typographical errors. Paragraphs [0013.1] and [0021.1] have been added to describe new Fig.

3 and paragraphs [0012] and [0013] have been amended as a result of the addition of paragraph [0013.1]. New paragraphs [0013.1] and [0021.1] are consistent with originally filed paragraph [0008] and originally filed Claims 1, 3, and 4. Thus, no new matter has been added.

Drawings

The Examiner objected to the drawings under 37 C.F.R. §1.83(a), stating that "the recitation 'a transformer' in claim 3 [sic, claim 4] must be shown or the feature(s) canceled from the claim(s)."

New Fig. 3 is submitted herewith, which shows "a transformer" as requested. Fig. 3 is described in originally filed paragraph [0008] and originally filed claims 1, 3, and 4. Thus, no new matter is added.

Claim Rejections – 35 U.S.C. §112

Claims 1-10 were rejected under 35 U.S.C. §112, first paragraph, as failing to comply with the enablement requirement. The Examiner stated that the "recitation '... conductive and non-conductive at a high frequency to thereby operate the DC-DC- converter in the **critical discontinuous mode** and equipped with circuitry for ...' in claim 1 that is disclosed on the specification, page 1, is indefinite because according to figure 1 of the present application, the input signal is a DC signal thus, there will be a current flowing through the inductive element (L) whether switch (Q1) closes or opens." [Emphasis in the original.] Applicants respectfully disagree.

As discussed above, the operation of a DC-DC converter in a discontinuous mode is well known in the art. It is well known that the change in current through an inductor with respect to time is related to the voltage across the inductor, i.e., $V=L(dI/dt)$. As described in the specification at paragraph [0017] and [0018], when the switch Q1 is conductive, the current through the inductive element L will increase linearly, and when the switch Q1 is non-conductive, the current through the inductive element L will decrease linearly to substantially zero.

Accordingly, Applicants submit that the recitation "to thereby operate the DC-DC-converter in the critical discontinuous mode" is enabled as one of ordinary skill in the art would be able to make and use the claimed invention. Reconsideration and withdrawal of the present rejection is therefore respectfully requested.

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<u>Claim Rejections – 35 U.S.C. §102</u>

Claim 1 was rejected under 35 U.S.C. §102(b) as being anticipated by Vinciarelli (4,648,020) ("Vinciarelli"). Applicants respectfully traverse.

Vinciarelli is related to an array of parallel DC-to-DC power converters. As illustrated in Figs. 1 and 2, a driver module 24, which includes a converter 16 and controller 18, is connected in parallel to a power booster module 26, which includes a second converter 28 and controller 30. <u>See</u>, col. 2, lines 30-53. The controller 18 in driver module 24 provides a control pulse that controls the converter 16 as well as the converter 28 via controller 30 in the power booster module 26. Col. 2, lines 34-41 and 51-53. Thus, it can be seen that the controller 30 in the power booster module 26 is separate from the driver module 24.

Claim 1 recites "a control circuit coupled to a control electrode of the switching element for generating a high frequency control signal for rendering the switching element conductive and non-conductive at a high frequency to thereby operate the DC-DC-converter in the critical discontinuous mode and equipped with circuitry for controlling the current through the output terminals at a predetermined value".

The Examiner stated that figures 2, 4, and 5 of Vinciarelli shows a circuit arrangement that includes all the elements of Claim 1. In particular, the Examiner stated that "a control circuit (30) coupled to a control electrode of the switching element for generating a high frequency control signal ... and equipped with circuitry (24) for controlling the current through the output terminals at a predetermined value ...." Contrary to the Examiner statement, however, the controller 30 is not "equipped with circuitry for controlling the current through the output terminals" as recited in Claim 1. The controller 30 is separate from the driver module 24 and therefore controller 30 is not "equipped with circuitry (24)".

Additionally, Claim 1 recites

> the circuitry for controlling the current through the output terminals comprising:
>> a circuit coupled to the input terminals and the output terminals for controlling a time lapse T_{on}, during which the switching element is maintained in a conductive state during each high frequency period of the control signal, proportional to a mathematical expression that is a function of V_{in} and V_{out}, wherein V_{in} is the voltage present between the input terminals and V_{out} is the voltage present between the output terminals.

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The Examiner stated that "because circuit (24) is coupled between the inputs and outputs of the DC-DC converter, the frequency period of the control signal is a function of the input/output voltages." Applicants respectfully disagree.

The Examiner's cited circuit 24 is the driver module, which includes the converter 16 and the controller 18. Only the converter 16 is coupled between the input terminals and output terminals. The converter 16, however, does not control the time lapse T_{on}. It is the controller 18 that provides the switching signals to the switching device in converter 16, as well as to the converter 28 via controller 30. Col. 2, lines 36-41 and lines 49-53. As can be seen in Figs. 1, 2, and 5, the converter 18 is not coupled to the input terminals, but is only coupled to the output terminals, i.e., between series coupled resistors 22 and 23.

Thus, Vinciarelli does not teach or suggest "a circuit coupled to the input terminals and the output terminals for controlling a time lapse T_{on}, during which the switching element is maintained in a conductive state during each high frequency period of the control signal". Moreover, Vinciarelli fails to teach or suggest that the time lapse T_{on} is "proportional to a ... function of V_{in}. and V_{out}" as recited in Claim 1.

Thus, Applicants respectfully submit that Claim 1 is patentable over Vinciarelli. Reconsideration and withdrawal of this rejection is respectfully requested. Claims 2-10 depend from Claim 1 and are, therefore, likewise patentable.

For the above reasons, Applicants respectfully request allowance of Claims 1-10. Should the Examiner have any questions concerning this response, the Examiner is invited to call the undersigned at (408) 982-8200, ext. 2.

Via Express Mail Label No. **EV 450 194 631 US**

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